

The Pfannenstiel Incision as a Source of Chronic Pain

Maarten J. Loos, MD, Marc R. Scheltinga, MD, PhD, Leon G. Mulders, MD, PhD, and Rudi M. Roumen, MD, PhD

OBJECTIVE: To estimate prevalence, risk factors, and etiology of post-Pfannenstiel pain syndromes.

METHODS: All women (n=866) with a Pfannenstiel incision for cesarean delivery or abdominal hysterectomy performed between January 2003 and December 2004 received a questionnaire evaluating pain located in the Pfannenstiel region. A multivariate logistic regression analysis was done to determine predictors for chronic pain development. Patients with moderate or severe pain were interviewed and underwent a physical examination.

RESULTS: The response rate was 80% (690 of 866 patients). Subsequent to a follow-up after 2 years, one third (223 of 690) experienced chronic pain at the incision site. Moderate or severe pain was reported by 7%, and in 8.9% of respondents, pain impaired daily activities. Numbness, recurrent Pfannenstiel surgery, and emergency caesarean delivery were significant predictors of chronic pain. Nerve entrapment was present in over half the examined patients with moderate-to-severe pain (17 of 32).

CONCLUSION: Chronic pain occurs commonly after a Pfannenstiel incision. Nerve entrapment was found to be a frequent cause of moderate-to-severe pain.

(*Obstet Gynecol* 2008;111:839–46)

LEVEL OF EVIDENCE: II

The Pfannenstiel incision is praised for its low incidence of incisional hernias (0–2%) and esthetically pleasing appearance ever since its introduction in 1900.¹ A Pfannenstiel approach (also termed the “bikini-cut”) is frequently used for safe access in pelvic

surgery including cesarean deliveries and gynecologic interventions. Furthermore, it is also used for an appendectomy, prostatectomy, and inguinal hernioplasty.^{2,3} Recently, minimally invasive laparoscopic gastrointestinal and urological procedures have used the Pfannenstiel incision and its modifications for removal of several organs, including colon and kidney.^{4,5}

Despite the described advantages, some authors have reported chronic pain associated with entrapment of lower abdominal wall nerves such as the iliohypogastric or the ilioinguinal nerves.^{6–13} Although chronic nerve-related postoperative pain is extensively studied in various surgical fields such as axillary surgery, thoracotomy, amputations, and inguinal hernia repair,^{14–17} data on chronic pain after a Pfannenstiel incision are scarce and knowledge is limited. The aim of the present study is to estimate prevalence, risk factors, and etiology of chronic pain after a Pfannenstiel incision, with special attention to nerve entrapment in a large cohort of patients.

PATIENTS AND METHODS

The study was performed as a combined effort by the surgical and gynecologic departments of the Máxima Medical Centre, a teaching hospital in Veldhoven, a city in the southeastern part of the Netherlands serving a population of approximately 175,000. All adult women, aged 18 years or older, who underwent a primary or secondary cesarean delivery or an abdominal hysterectomy using a Pfannenstiel incision between January 1, 2003, and December 31, 2004, were eligible for this study. Patients were not included if abdominal access was gained by a midline laparotomy, vaginally, or by laparoscopic-assisted techniques. Patients with recurrent Pfannenstiel incisions in 2005 or 2006 were also excluded because a minimal follow-up period of at least 1 year was deemed important for the aim of the study. Patients with a previous abdominal surgery (other than a Pfannenstiel incision)

From the Departments of General Surgery and Obstetrics and Gynaecology, Máxima Medical Centre, Veldhoven, the Netherlands.

Corresponding author: Maarten J. Loos, MD, Máxima Medical Centre, P.O. Box 7777, De Run 4600, 5500 MB Veldhoven, the Netherlands; e-mail: loosmaarten@hotmail.com.

Financial Disclosure

The authors have no potential conflicts of interest to disclose.

© 2008 by The American College of Obstetricians and Gynecologists. Published by Lippincott Williams & Wilkins.

ISSN: 0029-7844/08



were excluded as well, unless a laparoscopic technique was used (eg, laparoscopic appendectomy). Surgical and gynecologic clinical and outpatient charts were studied, and data were collected, including age, date of operation, elective and emergency cesarean delivery, and previous laparoscopic surgery.

In our teaching hospital, a Pfannenstiel incision is generally performed by consultant gynecologists or senior residents supervised by a consultant according to the following protocol. A 12- to 15-cm transverse incision is made approximately 2–3 cm cranial to the symphysis pubis, and subcutaneous fat and rectus sheath is diathermally incised. If necessary, the incision is extended laterally by cutting the fibrous sheath containing the aponeuroses of the external, internal oblique and transverse abdominal muscles. The anterior fascia and linea alba are separated from underlying rectus and pyramidalis muscles over the entire distance between symphysis and umbilicus. Abdominal rectus muscles are then separated in the midline, followed by division of the preperitoneal fat tissue and the opening of the peritoneum. No retractors are used. Once the abdominal procedure is completed, 2.0 polyglactin (Vicryl; Ethicon, Inc., Somerville, NJ) absorbable running sutures are used to approximate facial and muscle layers. The skin is closed intradermally.

Each patient who met study criteria was sent a questionnaire with a prestamped envelope by mail in February 2006. All questions concerned a 1-month period before reception of the questionnaire. A portion of items in the present questionnaire was extracted from three other published questionnaires used in postoperative pain studies (Appendix).^{17,19,20} Patients were asked to report the average frequency and intensity of pain situated close to or in their Pfannenstiel incision using a previously validated 4-point verbal rating scale (1=absent, 2=mild, 3=moderate, 4=severe).²¹ If patients experienced pain, they were offered 10 separate pain descriptors that are thought to reflect either a neuropathic or a nonneuropathic origin.¹⁹ Women were also instructed to mark the exact location of pain in a schematic drawing (Fig. 1). Patients were instructed to measure scar length (in centimeters) and asked to report pain-related doctor's consultations, use of pain medication, aggravation of scar pain during a menstrual period, observed bulging of the scar, number of "Pfannenstiel surgeries," presence of numbness, and functional impairment. Patients who did not respond to the first questionnaire were sent a reminder by mail.

In the present study, pain is defined as chronic using the International Association for the Study of

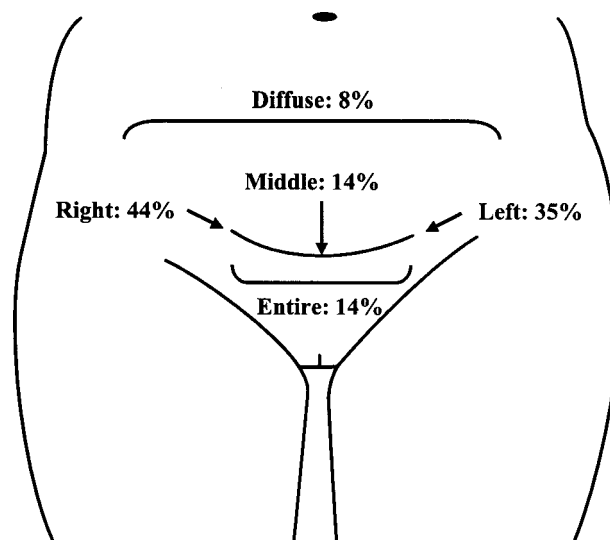


Fig. 1. Schematic drawing in questionnaire that women used for pain localization with corresponding results (n=205, missing data in 18 patients). Pain distribution showed in percentages: at the right end of the scar, left end, entire scar, middle of the scar, and diffusely in the lower abdomen. Thirty patients reported pain at both lateral ends of the scar. Mean (standard deviation) incision length=13.5 (± 3.4) cm.

Loos. Pfannenstiel Incision. *Obstet Gynecol* 2008.

Pain's definition (pain persisting beyond the normal tissue healing time, assumed to be 3 months).²² This definition includes the entire spectrum of pain intensities (mild, moderate, and severe).

Only patients with moderate or severe pain complaints as determined by the verbal rating scale were invited for follow-up at the outpatient department. A standardized evaluation of pain etiology was performed by a team consisting of a resident (M.J.L.) and two general surgeons skilled in diagnosing abdominal wall and groin pain pathology (M.R.S. or R.M.R.).²³ Pain history was taken, with special attention to neuropathic pain, which is traditionally characterized as an activity-induced "sharp" pain, located at one or both lateral edges of the incision. These painful sensations frequently irradiate toward a labium or upper inner thigh or both. Stretching, upper body torsion, or flexion of the hip joint can induce pain by means of traction or compression of an entrapped nerve.

The physical examination includes attention to signs of neurophysiological disorders such as hypoesthesia, hyperesthesia, or allodynia and pain elicitation by direct pressure on a distinct "trigger point" located along the lateral edge of the abdominal rectus margin. If the pain is considered neuropathic, a fan-shaped



deposition of an anesthetic (10 mL of 1% lidocaine) is placed around this trigger point and should provide immediate pain relief. In contrast, nociceptive or inflammatory causes may be supposed if these neuropathic signs are absent. Patients were also evaluated by the gynecologist (L.G.M.) if a gynecologic abnormality was suspected as a cause for their pain.

Continuous data were expressed as medians with ranges and were compared using a Mann-Whitney *U* test. Categorical data are presented as percentage frequencies, and differences between proportions were compared using a χ^2 test. A univariate logistic regression analysis was performed to test the influence of possible risk factors on chronic pain. Presence of chronic pain was the dependent variable, whereas age, follow-up duration, priority of cesarean delivery, number of Pfannenstiel incisions, numbness, and scar length were used as independent variables. The multivariate model was constructed by backward stepwise selection, with entry testing based on significance of score statistics. Cesarean delivery priority was assessed in a multivariate analysis with cesarean delivery patients only. The

limit of statistical significance was set at $P=.05$ (two-sided). Analysis was performed using SPSS 12.0.1 (SPSS Inc., Chicago, IL)

RESULTS

A total of 872 cesarean deliveries and 95 abdominal hysterectomies using a Pfannenstiel approach were performed during the 2-year time period. A patient flow chart is depicted in Figure 2. There were 866 post-Pfannenstiel patients who were eligible for this study, and each patient was sent a questionnaire. Eventually, 690 patients returned their questionnaires (response rate 690 of 866, 80%). Demographic and clinical details of both responders as well as nonresponders are listed in Table 1. Except for priority of cesarean delivery, these two groups were comparable. A cesarean delivery was performed in more than 90% of the women, and an average cesarean delivery patient was approximately 15 years younger than an abdominal hysterectomy patient (35 compared with 50 years, $P<.05$). About 25% of the individuals had received previous surgery using the Pfannenstiel incision.

Approximately one third of all patients (223 of 690, 33%) experienced chronic pain at the incision

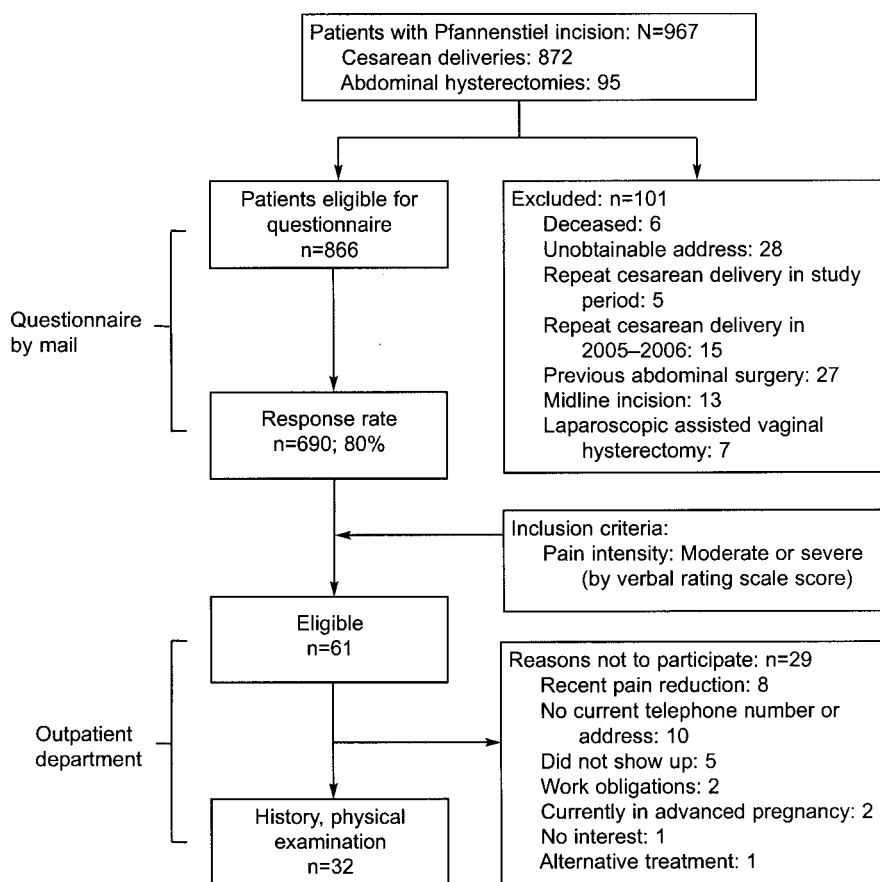


Fig. 2. Flow chart of included and excluded patients after a Pfannenstiel incision.

Loos. Pfannenstiel Incision. *Obstet Gynecol* 2008.



Table 1. Characteristics of Included Patients (n=866) and of Those Eligible for Additional Follow-up at the Outpatient Department Based on High Pain Scores*

	Questionnaire (Total n=866)			Outpatient Department (Total n=61)		
	Responders (n=690)	Nonresponders (n=176)	P	Participators (n=32)	Nonparticipators (n=29)	P
Median age [y (range)]	35 (21–77)	24 (21–54)	.120	34 (27–53)	35 (22–52)	.800
CD/AH (%)	643/47 (93/7)	167/9 (95/5)	.414	31/1 (97/3)	26/3 (90/10)	.255
Median follow-up [mo (range)]	26 (14–38)	26 (14–38)	.731	21 (14–35)	26 (15–38)	.251
Priority CD elective/emergency (%)	206/437 (32/68)	40/127 (24/76)	.043	10/21 (32/68)	5/21 (19/81)	.283
No. of Pfannenstiel incisions [n (%)]						
Two incisions	133 (19)	24 (14)	.478	7 (22)	9 (31)	.716
More than two incisions	48 (7)	4 (2)		4 (13)	3 (10)	
Previous laparoscopic surgery [n (%)]	44 (6)	5 (3)	.070	2 (6)	6 (21)	.095

CD, cesarean delivery; AH, abdominal hysterectomy.

* Verbal rating scale = moderate or severe, n=61.

site during the month before assessment (median follow up: 26 months). Pain frequency and intensity are graphically shown in Figures 3 and 4, respectively. One of every 12 patients (61 of 690, 8.2%) experienced pain on a regular or continuous basis, whereas moderate or severe pain was reported by 61 patients (7.0%). A total of 8.9% of the women were impaired in daily activities because of pain intensity (Table 2). Both neuropathic (eg, “stabbing,” “prickling”) and nonneuropathic (eg, “nagging,” “pulling”) descriptors were chosen in similar quantities (27.7% compared with 30.0%, respectively). More than 90% of the population (189 of 205, 92%) experienced their pain at the level of the incision, and in 70% (132 of 189), the pain was located at lateral end(s) of the incisional scar (Fig. 1). Table 2 shows medical consumption as reflected by number of pain-related

consultations (8% of patients, mostly visiting a general practitioner) and intake of pain medication (3%). The onset of a menstrual cycle exacerbated scar pain in 8.1% of the women. Mean incision length (standard deviation) was 13.5 (± 3.4) cm.

Using multivariate logistic regression analysis, more than two Pfannenstiel incisions (odds ratio [OR] 2.92; 95% confidence interval [CI] 1.44–5.93) and presence of numbness (OR 3.01; 95% CI 2.05–4.40) did significantly and independently predict chronic pain, whereas age, follow-up, and scar length did not (Table 3). In subgroup multivariate analysis, emergency cesarean delivery remained a significant factor (OR 1.56; 95% CI 1.01–2.40).

All patients with moderate or severe pain (n=61) as determined by the verbal rating scale scoring

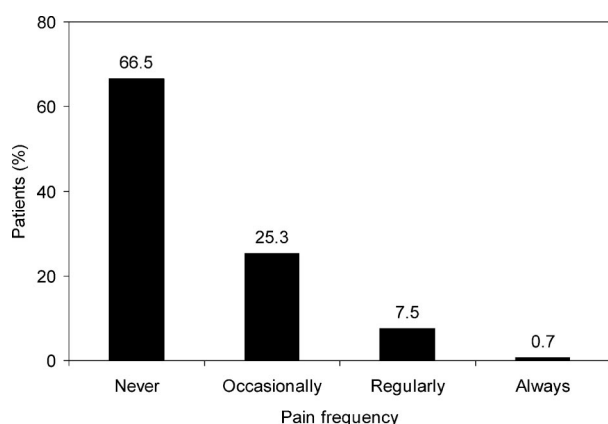


Fig. 3. Pain frequency in patients after a Pfannenstiel incision (n=689, one patient missing).

Loos. Pfannenstiel Incision. *Obstet Gynecol* 2008.

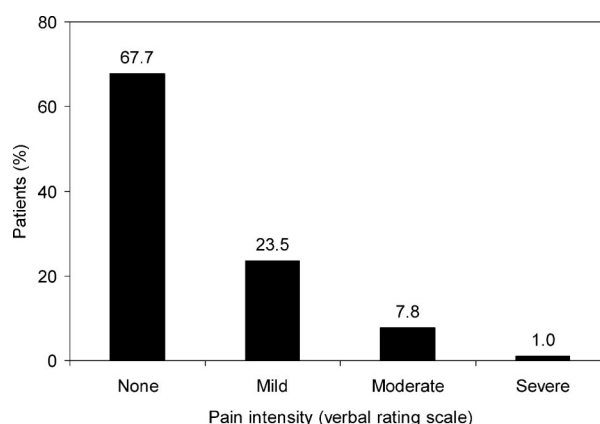


Fig. 4. Pain intensity in patients after a Pfannenstiel incision (n=690).

Loos. Pfannenstiel Incision. *Obstet Gynecol* 2008.



Table 2. Chronic Pain Characteristics Reported by Patients Who Responded to the Questionnaire (n= 690)

	n (%)
Previous visits to a physician because of persisting pain*	
General practitioner	32 (4.6)
Gynecologist	15 (2.2)
General surgeon	5 (0.7)
Other (specialty of consulted physician unknown)	3 (0.4)
Frequency of pain medication intake*	
Yes, occasionally	16 (2.3)
Yes, regularly	5 (0.7)
Cyclic pain*	56 (8.1)
Bulge noticed*	130 (18.8)
Numbness*	199 (28.8)
Functional impairment	
None	628 (91.0)
Mild	45 (6.5)
Moderate	16 (2.3)
Severe	1 (0.1)

* Pain located at the Pfannenstiel incision.

system were eligible for follow-up. Because 29 patients did not participate in this assessment for reasons as stated in Figure 2, a population of 32 patients was evaluated using an extensive interview and a physical examination. The demographic and clinical details of these patients are shown in Table 1. This subgroup forms a representative portion of the entire population. Findings of pain history and physical examination are listed in Table 4.

Neuropathic pain caused by an entrapment of the iliohypogastric or ilioinguinal nerve was present in 17 patients (17 of 32, 53%). Nine patients opted for a diagnostic nerve block that led to a significant pain reduction in six of them. The initial pain reduction persisted for at least 12 months in two of these six patients. The remaining eight patients refused injection.

A variety of nonneuropathic causes was diagnosed, including nonspecific diffuse scar pain. Bulges indicating incisional hernias were not found, although one patient presented with bulging of the entire lower abdominal wall due to muscle atrophy. Two patients complained of a "pulling" pain confined to the midline, which was classified as musculotendinous in origin. Keloid formation and fat necrosis produced local scar pain in two other patients. Three additional patients were diagnosed by the gynecologist with endometriosis, secondary vaginism, and primary dysmenorrhoea, respectively. A diagnostic classification of post-Pfannenstiel syndromes is proposed in Table 5.

DISCUSSION

The current study showed that chronic pain after a Pfannenstiel incision is common. These results are thought valid and representative because 80% of a large sample size responded to the questionnaire. Even if all nonresponders were pain free, the pain prevalence would still be 26%. As far as we know, the well-known international Term Breech Trial is the only study that prospectively assessed pain after both cesarean deliveries and vaginal births.²⁴ Based on an intention-to-treat analysis, they concluded that the total reported pain was similar in both groups (planned cesarean delivery, 21%, compared with planned vaginal birth, 22.2%). However, when those patients who actually had a cesarean delivery (n=611) were compared with those who actually underwent a vaginal birth (n=306), it appeared that cesarean delivery patients more often complained of abdominal pain (outside 4.7%, deep 6.2%, total 10.9%) than those after vaginal birth (outside 1.6%, deep 3.9%, total 5.5%). In our opinion, this significant difference (by Fisher exact test) is most probably associated with the surgical abdominal intervention itself and partially scar-related. Another study using questionnaires among a group of patients with Pfannenstiel incisions (93% of 221 cesarean delivery patients) identified a 12.3% lower abdominal pain prevalence after 1 year, but grade was not reported.²⁵ Similarly, chronic pain was mentioned by 23% of patients 5 years after a Pfannenstiel incision, but also not graded (n=243).¹⁸ Results of these and our study indicate that post-Pfannenstiel pain is common, even after an extended time period. Most women are thought to accept this chronic pain, although one of 12 patients consulted a physician and received symptomatic medical treatment.

Why do some patients develop severe postoperative pain after a Pfannenstiel incision, whereas others do not? Previous research identified length of incision as an exclusive factor for pain development.¹⁸ The innervating nerves of the suprapubic area and lower abdominal portions are easily damaged or trapped when the incision is extended beyond lateral edges of the rectus sheath ("danger area"). Moreover, sutures or scar tissue trapping nervous tissue as well as neuroma formation may also result in neuropathic pain. Although the present study could not confirm scar length as a risk factor for pain, 70% of all women experienced pain in lateral portions of the scar, indicating the lateral borders of importance in Pfannenstiel pain mechanism. Other significant chronic pain predictors include regional numbness and recur-



Table 3. Logistic Regression Analysis of Risk Factors Predicting Chronic Pain Development Following a Pfannenstiel Incision (n=690)

	Univariate Model			Multivariate Model		
	OR	(95% CI)	P	OR	(95% CI)	P
Age	1.0	(1.0–1.0)	.079	–		
Follow-up duration	0.99	(0.99–1.0)	.036	–		
Emergency CD*	1.53	(1.07–2.20)	.021	1.56	(1.01–2.40)	.020*
No. of Pfannenstiel incisions						
Two incisions	1.60	(1.07–2.39)	.020	1.27	(0.82–1.97)	.291
More than two incisions	2.95	(1.62–5.37)	.000	2.92	(1.44–5.93)	.003
Numbness	3.19	(2.25–4.51)	.000	3.01	(2.05–4.40)	.000
Scar length	1.06	(1.01–1.11)	.029	–		

OR, odds ratio; CI, confidence interval; CD, cesarean delivery.

* Emergency CD in multivariate analysis among CD patients.

rent surgery, denominators that were also found important in a recent study evaluating pain after inguinal hernia repair.¹⁷ Increased risk of nerve entrapment after recurrent surgery is likely due to the development of larger areas of fibrosis. An additional risk for pain was an emergency cesarean delivery

rather than an elective operation. One may hypothesize that suboptimal conditions and a stressed surgical technique may enhance iatrogenic traumatization of nerves and other tissues. The identification of risk factors for postoperative Pfannenstiel pain may be used in optimizing the surgical technique, as well as the process of informed consent, before a surgical procedure.

One may question the value of a questionnaire as a means of detecting the origin of pain because visceral pain is often difficult to distinguish from parietal pain.²⁶ Assessment of nerve involvement and other abdominal wall pathology requires physical examination, with additional testing performed by specialists trained in recognizing patterns of pain. In the present study, a little over half of all patients (32 of 61) reporting moderate-to-severe pain were interviewed and underwent a physical examination. Interestingly, more than half of this population (17 of 32) was diagnosed with entrapment of iliohypogastric or ilioinguinal nerves. With the limited number of ex-

Table 4. Pain History and Physical Examination in Patients Who Visited the Outpatient Department Based on High Pain Scores*

	n (%)
Pain history	
Character	
Neuropathic	23 (72)
Nonneuropathic	9 (28)
Frequency	
Occasionally	2 (6)
Regularly	12 (38)
Always	20 (58)
Course	
Constant	22 (68)
Intermittent	4 (13)
Progressive	2 (6)
Decreasing	4 (13)
Other chronic pain syndromes†	23 (72)
Physical examination	
Bulge	1 (3)
Neurophysiology	
Normal	14 (44)
Hypoesthesia	14 (44)
Hyperesthesia	3 (9)
Allodynia	1 (3)
Trigger point	17 (53)
Nerve block (lidocaine 1%)	9 (28)
Significant pain reduction (10 min)*	6 (18)
Persisting total pain reduction (12 mo)*	2 (6)

* Verbal rating scale=moderate or severe, n=61.

† Chronic pain syndromes include chronic headache, low back pain, complex regional pain syndrome, and irritable bowel syndrome.

* Pain reduction following nerve block after 10 minutes and after 12 months.

Table 5. Diagnostic Classification of Patients With Chronic Pain After a Pfannenstiel Incision (n=32)

	n (%)
Neuropathic	17 (53.1)
Nonneuropathic	
Nongynecologic	
Diffuse scar pain	7 (21.9)
Musculotendinous	2 (6.3)
Abdominal wall atrophy with bulging	1 (3.1)
Keloid	1 (3.1)
Fat necrosis	1 (3.1)
Gynecologic	
Endometriosis	1 (3.1)
Secondary vaginism	1 (3.1)
Dysmenorrhea	1 (3.1)



amined patients, this percentage (2.5%, 17 of 690) approximating a previously reported incidence of 2.3%,¹⁸ is probably an underestimation. Interestingly, two patients with nerve entrapment who received a single lidocaine block experienced ongoing pain relief. This phenomenon, also described in patients with postherniorrhaphy groin pain, may possibly be explained by the hypothesis of resetting pain stimulation thresholds.²³ Nerve block failure (as in three patients with neuropathic pain symptoms) may indicate that the central nervous system is inflicted as well, eliminating the possibility of pain reduction by blocking peripheral nerves. However, anesthetic blocks in suspected nerve entrapment syndromes are important as diagnostic and, possibly, therapeutic measures.

The present inventory has identified a variety of diagnoses, including several nonneuropathic syndromes after a Pfannenstiel incision. Although not encountered in the present study, cutaneous endometriomas in Pfannenstiel incisions have been previously described.^{27,28} Furthermore, lower abdominal pain after abdominal surgery may also be of visceral origin, such as intraabdominal adhesions associated with frequent complaints of altered bowel habits.²⁹

Although long-term pain after a Pfannenstiel incision has been identified in some earlier studies, the present study demonstrates the large prevalence of Pfannenstiel pain with contributing risk factors.³⁰ Doctor's delay and unnecessary psychosomatization of pain complaints, events that frequently occurred in this patient population, may be avoided if awareness of these pain syndromes is increased.

REFERENCES

- Kisielinski K, Conze J, Murken AH, Lenzen NN, Klinge U, Schumpelick V. The Pfannenstiel or so called "bikini cut": still effective more than 100 years after first description. *Hernia* 2004;8:177-81.
- Manoharan M, Vyas S, Araki M, Nieder AM, Soloway MS. Concurrent radical retropubic prostatectomy and Lichtenstein inguinal hernia repair through a single modified Pfannenstiel incision: a 3-year experience. *BJU Int* 2006;98:341-4.
- Saetta JP, Abel KP. The use of the Pfannenstiel incision in the female with presumed appendicitis. *Br J Clin Pract* 1990;44:145-7.
- Tisdale BE, Kapoor A, Hussain A, Piercey K, Whelan JP. Intact specimen extraction in laparoscopic nephrectomy procedures: Pfannenstiel versus expanded port site incisions. *Urology* 2007;69:241-4.
- Kessler H, Hohenberger W. Laparoscopic total colectomy for slow-transit constipation. *Dis Colon Rectum* 2005;48:860-1.
- Whiteside JL, Barber MD. Ilioinguinal/iliohypogastric neurectomy for management of intractable right lower quadrant pain after cesarean section: a case report. *J Reprod Med* 2005;50:857-9.
- Melville K, Schultz EA, Dougherty JM. Ilioinguinal-iliohypogastric nerve entrapment. *Ann Emerg Med* 1990;19:925-9.
- Tosun K, Schäfer G, Leonhartsberger N, Herwig R, Pinggera G-M, Bartsch G, et al. Treatment of severe bilateral nerve pain after Pfannenstiel incision. *Urology* 2006;67:623.e5-6.
- Hahn L. Clinical findings and results of operative treatment in ilioinguinal nerve entrapment syndrome. *Br J Obstet Gynaecol* 1989;96:1080-3.
- Huikeshoven FJ, Dukel L. The bikini incision: nice, but not without painful complications [in Dutch]. *Ned Tijdschr Geneesk* 1998;142:1481-3.
- Sippo WC, Burghardt A, Gomez AC. Nerve entrapment after Pfannenstiel incision. *Am J Obstet Gynecol* 1987;157:420-1.
- Sippo WC, Gomez AC. Nerve-entrapment syndromes from lower abdominal surgery. *J Fam Pract* 1987;25:585-7.
- Piura B. Nerve entrapment after Pfannenstiel incision. *Am J Obstet Gynecol* 1989;161:499-500.
- Kooijman CM, Dijkstra PU, Geertzen JHB, Elzinga A, van der Schans CP. Phantom pain and phantom sensations in upper limb amputees: an epidemiological study. *Pain* 2000;87:33-41.
- Perttunen K, Tasmuth T, Kalso E. Chronic pain after thoracic surgery: a follow-up study. *Acta Anaesthesiol Scand* 1999;43:563-7.
- Wallace MS, Wallace AM, Lee J, Dobke MK. Pain after breast surgery: a survey of 282 women. *Pain* 1996;66:195-205.
- Loos MJA, Roumen RMH, Scheltinga MRM. Chronic sequelae of common elective groin hernia repair. *Hernia* 2007;11:169-73.
- Luijendijk RW, Jeekel J, Storm RK, Schutte PJ, Hop WC, Drogendijk AC, et al. The low transverse Pfannenstiel incision and the prevalence of incisional hernia and nerve entrapment. *Ann Surg* 1997;225:365-9.
- Bay-Nielsen M, Perkins FM, Kehlet H. Pain and functional impairment 1 year after inguinal herniorrhaphy: a nationwide questionnaire study. *Ann Surg* 2001;233:1-7.
- Callesen T, Bech K, Kehlet H. Prospective study of chronic pain after groin hernia repair. *Br J Surg* 1999;86:1528-31.
- Loos MJ, Houterman S, Scheltinga MR, Roumen RM. Evaluating postherniorrhaphy groin pain: Visual Analogue or Verbal Rating Scale? *Hernia* 2007; Nov 15, Epub ahead of print.
- Classification of chronic pain. Descriptions of chronic pain syndromes and definitions of pain terms. Prepared by the International Association for the Study of Pain, Subcommittee on Taxonomy. *Pain* 1986;3 suppl:S1-S226.
- Loos MJ, Roumen RM, Scheltinga MR. Classifying postherniorrhaphy pain syndromes following elective inguinal hernia repair. *World J Surg* 2007;31:1760-5.
- Hannah ME, Whyte H, Hannah WJ, Hewson S, Amankwah K, Cheng M, et al. Maternal outcomes at 2 years after planned cesarean section versus planned vaginal birth for breech presentation at term: the international randomized Term Breech Trial. *Am J Obstet Gynecol* 2004;191:917-27.
- Nikolajsen L, Sørensen HC, Jensen TS, Kehlet H. Chronic pain following Caesarean section. *Acta Anaesthesiol Scand* 2004;48:111-6.
- Mandelkow H, Loeweneck H. The iliohypogastric and ilioinguinal nerves. Distribution in the abdominal wall, danger areas in surgical incisions in the inguinal and pubic regions and reflected visceral pain in their dermatomes. *Surg Radiol Anat* 1988;10:145-9.
- Daye SS, Barone JE, Lincer RM, Blabey RC, Smego DR. Pfannenstiel syndrome. *Am Surg* 1993;59:459-60.
- Blanco RG, Parithivell VS, Shah AK, Gumbs MA, Schein M, Gerst PH. Abdominal wall endometriomas. *Am Jour Surg* 2003;185:596-8.



29. Monk BJ, Berman ML, Montz FJ. Adhesions after extensive gynecologic surgery: clinical significance, etiology, and prevention. *Am J Obstet Gynecol* 1994;170:1396-403.
30. Ducic I, Moxley M, Al-Attar A. Algorithm for treatment of postoperative incisional groin pain after cesarean delivery or hysterectomy. *Obstet Gynecol* 2006;108:27-31.

APPENDIX

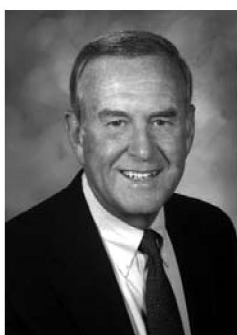
Questionnaire sent to all patients:

1. How often did you experience pain at the lower transverse abdominal scar during the previous month?
Never/ occasionally/ regularly/ always
2. How intense was the pain at the lower transverse abdominal scar during the previous month?
None/ mild/ moderate/ severe
3. Please choose one or more of the following characteristics best describing your pain at the lower transverse abdominal scar during the previous month.
Burning, stabbing, sharp, electric, prickling, gnawing, pounding, pinching, nagging, pulling
4. Please mark with an x the exact location of your pain during the previous month using the following schematic drawing (Fig. 1).
5. Please measure the length of the lower transverse abdominal scar. *Length scar= cm*
6. Did you ever visit a physician because of pain complaints at the lower transverse abdominal scar since the operation?
No/ yes, please specify: (name/ speciality physician)
7. Did you take any pain medication because of pain complaints at the lower transverse abdominal scar during the previous month?
No/ yes, occasionally/ yes, regularly
8. Was there any aggravation of pain at the lower transverse abdominal scar during menstruation during the previous month?
No/ yes
9. Have you ever noticed a bulge at the lower transverse abdominal scar?
No/ yes
10. How many times were you operated on using the lower transverse abdominal incision?
Once/ twice/ more than twice
11. Did you notice any numbness of the skin at the lower transverse abdominal scar during the previous month?
No/ yes
12. Were you functionally impaired in your daily activities caused by pain at the lower abdominal scar during the previous month?
Never/ occasionally/ regularly/ always
13. What was the average functional impairment intensity caused by pain at the lower abdominal scar during the previous month?
None/ mild/ moderate/ severe



Mark your calendars now to attend the Clinical Seminar, "How to Get Your Paper Published"

ACOG's 56th Annual Clinical Meeting, New Orleans, Louisiana



James R. Scott, MD
Editor-in-Chief
Obstetrics & Gynecology

Register online at www.acog.org for this Clinical Seminar:

- Receive practical advice on preparing a manuscript and dealing with the peer-review system
- Improve your skills in writing a scientific paper
- Receive practical advice on preparing the manuscript
- Learn what is important to reviewers and editors
- Review common mistakes
- Increase the chance your paper will be accepted



David A. Grimes, MD
Consultant Editor for
Epidemiology
Obstetrics & Gynecology

Monday, May 5, 2008

